Introduction & Background

Cooper Environmental Services, LLC has been retained to conduct an environmental assessment of two neighboring properties in Oak Bluffs, Massachusetts ("the site"). The purpose of this assessment is to characterize the general environmental setting as well as to classify the vegetative communities present and their potential value to local wildlife populations.

The site consists of two separate parcels of land encompassing 68± acres located on the east side of Barnes Road (positioned between the Pondview Drive subdivision and the Bayes Hill Road subdivision). The site was visited several times in August of 2010 and again in July of 2011. The land is presently undeveloped and is comprised of a mixed oak and pitch pine dominated forest within which a network of maintained footpaths provide convenient access across the properties. There are no wetlands or other watercourse features located on the site. However, Lagoon Pond, a 583-acre barrier beach pond with a 9-acre freshwater impoundment at its head, is located approximately 520 ft. to the west at its closest point to the site. The site is within the Lagoon Pond watershed and its groundwater recharge area.

In 1988, The Martha's Vineyard Commission, a regional planning agency of Dukes County, established Lagoon Pond and the adjacent lands within 1500 ft. of Mean High Water (MHW) a "District of Critical Planning Concern" (DCPC). The site resides within The Lagoon Pond DCPC. The Lagoon Pond DCPC received its designation because it was determined to support important natural and economic resources. The specific environmental qualifying criteria for this DCPC include the following:

1. Fishing Resource. Lagoon Pond is well suited for the production of shell or finfish or can be made productive through good management and improvements.
2. Wildlife, Natural, Scientific or Ecological Resource. The district contains an important and identifiable wildlife, natural, scientific or ecological resource. This would include, but not be limited to, special plant and animal life and their habitats, as well as unusual geological features, and is critical because development may disrupt the ecological balance.

The Lagoon Pond DCPC is also considered an "Economic or Development Resource District" and a "Major Public Investment District". Residential development in the Lagoon Pond DCPC is restricted to one bedroom per 15,000 square feet of land (MVC, 2006).

The site lies within an area designated as "Priority Habitat of Rare Species" by the Massachusetts Division of Fisheries & Wildlife - Natural Heritage and Endangered Species Program (NHESP). In August of 2010, an information request was submitted to the NHESP in accordance with the Massachusetts Endangered Species Act (MESA). The NHESP responded by providing a list of state-listed rare moth species that have been found in the vicinity of the site.

There were no casual observations of any state or federally listed rare, endangered or threatened plant species made during the field examinations. Detailed botanical studies conducted on the nearby "Southern Woodlands" property for the Down Island Golf Club development did not reveal any rare plant species in the local area (EES, 1999).

Environmental Description

Martha's Vineyard is located in the Southeast Coastal Zone of Massachusetts, specifically the Cape Cod/Long Island sub-ecoregion, which is characterized by terminal

moraines and outwash plains left behind by the retreating glaciers, and glacial deposits. The landscape is strongly influenced by coastal winds and saltwater spray.

Topography. The elevation of the property rises from approximately 50 ft. above mean sea level (MSL) at its western limit on Barnes Road to approximately 110 ft. MSL at its highest point near the northeast corner. Glacial retreat is responsible for the sloping terrain and meltwater channels across the site.

Landform/Surficial Geology. The site is situated on the Martha's Vineyard Moraine. At this terminal end of the Wisconsin ice sheet a thick deposit of boulders and stones in a variable matrix of sand, silt, and clay were deposited to form a rolling and hilly landform. This landform is then covered by stratified drift outwash and wind-blown (aeolian) sand deposits. These deposits are highly variable in thickness as a result of both the mode of deposition and subsequent erosional events that occurred during the post-glacial period.

Soils. The majority of the soils underlying the property consist of the Carver loamy coarse sand series (CeC – 8 to15% slopes). This soil series is very deep, strongly sloping and excessively drained on small hills and ridges on the moraine. Within the CeC mapping unit are pockets of Carver loamy coarse sand (CeD – 15 to 25% slopes) and Carver loamy coarse sand (CeB – 3 to 8% slopes). The CeD series is moderately steep and excessively drained on the side slopes of swales, while the CeB series is more gently sloping (USDA-SCS, 1986).

Residential development on the strongly and moderately sloping Carver soils typically requires re-contouring of the natural landform to accommodate homes and septic systems. These highly erodible soils necessitate careful construction practices and appropriately installed and regularly maintained erosion control measures to protect the site, adjacent properties and Lagoon Pond from sedimentation.

The Carver soil series is highly permeable and droughty during the summer months. The seasonal high water table is generally greater than six feet, with an average groundwater elevation in 2008 measuring approximately 5.25 ft. MSL at Tradewinds Airport located 2.5 miles northeast of the site (Wilcox 2009). Depth to groundwater at the subject site is estimated to be between 25 ft. and 45 ft. below the ground surface (Delaney 1980).

Natural Communities.

Pitch Pine-Oak Forest/Woodland.

Natural communities present on Martha's Vineyard today are an example of succession from open land to woodlands. Most of the island was clear-cut by early settlers for pastures, cropland, home and boat building, and fuel. The site is entirely forested with a single maintained gravel utility easement bisecting the land between Oak Wood Lane and Pondview Drive. This terrestrial forested community is classified as a *Pitch Pine-Oak Forest/ Woodland* (Swain and Kearsly, 2001). This community type has a State Rank of S5, indicating that the community is demonstrably secure in Massachusetts. The subject site contains predominantly oak species (white, black and scarlet oak) with pitch pines occurring as individuals or groves of varying density and occupying approximately 25% of the site. Mature trees are between 30-40 ft. in height with a cover value of greater than 65% in most locations. The forest understory exhibits a continuous expanse of ericaceous shrubs including huckleberries and lowbush blueberry broken only by maintained footpaths. Oak and pine saplings are growing where breaks in the canopy have allowed sunlight penetration. At the lower elevations, there is little to no variation in the understory except along the edges of the footpaths and the utility easement line. At higher elevations, there are pockets of standing dead oaks that fell victim to caterpillar infestations that plagued forests across the Vineyard

spanning the years between 2003 and 2008. The seedling and sapling vegetation is denser in these areas as pioneer pitch pines and oaks are re-establishing. Table 1 lists the plant species observed (this is not an exhaustive botanical survey, but rather a general representation of plant species present.)

Table 1 – Representative Plant Species (Casual Observation)

Strata (Layer)	Scientific Name	Common Name
Tree	*Betula papyrifera*	White birch (individual)
Tree	*Fagus grandifolia*	American beech
Tree/Sapling	*Pinus rigida*	Pitch pine
Tree	*Pinus strobus*	Eastern white pine
Tree/Sapling	*Prunus serotina*	Black cherry
Tree/Sapling	*Quercus alba*	White oak
Tree/Sapling	*Quercus coccinea*	Scarlet oak
Tree/Sapling	*Quercus velutina*	Black oak
Tree	*Quercus stellate*	Post oak
Shrub	*Gaylussacia baccata*	Black huckleberry
Shrub	*Gaylussacia frondosa*	Blue huckleberry (aka Dangleberry)
Shrub	*Quercus ilicifolia*	Scrub oak
Shrub	*Rhubus idaeus*	Red raspberry
Ground Cover	*Anaphalis margaritacea*	Pearly everlasting
Ground Cover	*Aralia nudicaulis*	Wild sarasparilla
Ground Cover	*Baptista tinctoria*	Wild indigo
Ground Cover	*Carex pensylvanica*	Pennsylvania sedge
Ground Cover	*Chimaphila maculate*	Striped Pipsissewa
Ground Cover	*Cypripedium acuale*	Pink lady-slipper
Ground Cover	*Gaultheria procumbens*	Wintergreen
Ground Cover	*Comptonia peregrine*	Sweetfern
Ground Cover	*Deschampsia flexuosa*	Hairgrass
Ground Cover	*Epigaea repens*	Trailing arbutus
Ground Cover	*Juncus tenuis*	Path rush
Ground Cover	*Panicum clandestinum*	Deer-tongue grass
Ground Cover	*Phytolacca Americana*	Pokeweed
Ground Cover	*Pteridium aquilinum*	Bracken fern
Ground Cover	*Toxicondendron radicans*	Poison Ivy

Wildlife Value.

Avifauna.

There are no wildlife species restricted to oak dominated woodlands, however they do support an assortment of animals. Martha's Vineyard is well known for its diversity of avian life. There was little bird activity observed at lower elevations at the site, due ostensibly to limited availability of food and water sources, however bird encounters increased at higher elevations near the tree mortality sites, as well as in closer proximity to neighboring residences with active feeders. The dead oak trees support burrowing beetles and other insects, which in turn provide food for insectivorous birds. Standing deadwood also offer opportunity for cavity-nesting birds. Commonly occurring birds that would utilize this woodland include species of warblers, chickadees, nuthatches, thrushes, woodpeckers, vireos and flycatchers. Direct observations of birds include: White-breasted Nuthatch, Northern Flicker, Black-capped Chickadee, American Robin, Red-tailed Hawk, Northern Cardinal and Downy Woodpecker. Table 2 is a list of known Martha's Vineyard bird species that may be observed in the vicinity of this forested site and neighboring residential developments (Whiting, 2007).

Table 2 – Bird Species of Vineyard Woodlands			
Scientific Name	**Common Name**	**Preferred Habitat**	**Island Status**
Melaegris gallopavo	Wild Turkey	Deciduous woods, edges & fields	Permanent resident
Colinus virginianus	Northern Bobwhite	Fields, roadsides, woodland edges	Uncommon
Accipiter striatus	Sharp-shinned Hawk	Woodland edges, winter feeders	Common transient & winter resident
Accipiter cooperii	Cooper's Hawk	Woods and woodland edges	Common year-round resident
Accipiter gentilis	Northern Goshawk	Woodlands	Rare fall transient & winter resident
Buteo jamaicensis	Red-tailed Hawk	Fields, woodland edges	Common permanent resident
Zenaida macroura	Mourning Dove	Deciduous and pine woods	Present all year
Coccyzus americanus	Yellow-billed Cuckoo	Deciduous woodlands	Summer resident & migrant
Coccyzus erythropthalmus	Black-billed Cuckoo	Deciduous woodlands & edges	Summer resident & transient
Megascops asio	Eastern Screech-owl	Deciduous woodlands, yards with mature trees	Common permanent resident
Aegolius acadicus	Northern Saw-Whet Owl	Pine woodlands & open fields	Uncommon fall transient & winterer
Caprimulgus vociferous	Whip-poor-will	Deciduous woodlands, esp. scrub oak	Uncommon
Archilocus colubris	Ruby-throated Hummingbird	Gardens & woodland borders	Common transient & summer resident
Melanerpes erythrocephalus	Red-headed Woodpecker	Deciduous woodlands & edges	Migrant
Melanerpes carolinus	Red-bellied Woodpecker	Wet deciduous woodlands	Present all year
Sphyrapicus varius	Yellow-bellied Sapsucker	Deciduous woodlands & edges	Spring & Fall transient
Picoides pubescens	Downy Woodpecker	Deciduous woodlands, edges & feeders	Common permanent resident
Picoides villosus	Hairy Woodpecker	Mature woodlands	Uncommon permanent resident
Colaptes auratus	Northern Flicker	Woodlands & fields	Present all year
Contopus virens	Eastern Wood-Pewee	Deciduous woodlands	Common summer resident
Sayornis phoebe	Eastern Phoebe	Woodland edges	Year round resident
Myiarchus crinitus	Great Crested Flycatcher	Deciduous woodlands	Common summer resident
Vireo solitaries	Blue-headed Vireo	Deciduous woodlands	Migrant
Vireo gilvus	Warbling Vireo	Deciduous woodlands near water	Uncommon transient
Vireo philadelphicus	Philadelphia Vireo	Deciduous woodlands	Common fall transient
Vireo olivaceus	Red-Eyed Vireo	Deciduous woodlands	Common summer resident
Cyanocitta cristata	Blue Jay	Deciduous & pine woodlands, feeders, yards	Common permanent resident
Corvus brachyrhynchos	American Crow	Fields, yards, seacoast	Common permanent resident
Peocile atricapillus	Black-capped Chickadee	Woodlands, feeders	Common permanent resident
Baeolophus bicolor	Tufted Titmouse	Deciduous woodlands	Uncommon permanent resident

Sitta carolinensis	White-breasted Nuthatch	Deciduous woodlands	Common permanent resident
Certhia Americana	Brown Creeper	Woodlands	Present all year
Thryothorus ludovicianus	Carolina Wren	Dense thickets & underbrush	Common permanent resident
Troglodytes aedon	House Wren	Woodland edges, gardens, marshes	Transient & summer resident
Regulus satrapa	Golden-crowned Kinglet	Coniferous woodlands	Common fall transient & winter resident
Regulus calendula	Ruby-crowned Kinglet	Thickets, coniferous & deciduous woodlands	Common transient
Catharus guttatus	Hermit Thrush	Coniferous & mixed deciduous woodlands	Common fall transient
Hylocichla mustelina	Wood Thrush	Deciduous woodlands	Uncommon summer resident
Turdus migratorius	American Robin	Deciduous woodlands, fields, yards	Present all year
Dumetella carolinensis	Gray Catbird	Thickets & deciduous scrub	Common summer resident
Mimus polyglottos	Northern Mockingbird	Hedgerows & thickets	Common permanent resident
Sturnus vulgaris	European Starling	Ubiquitous	Permanent resident
Bombycilla cedrorum	Cedar Waxwing	Fruiting trees, deciduous woodlands	Present all year
Vermivora ruficapilla	Nashville Warbler	Deciduous woodlands & scrub	Common fall transient
Parula Americana	Northern Parula	Moist woodlands	Common spring & fall transient
Dendroica tigrina	Cape May Warbler	Conifers, mixed woodlands	Common fall migrant
Dendroica coronata	Yellow-rumped Warbler	Woodlands, bayberry thickets	Common fall transient & winterer
Dendroica pinus	Pine Warbler	Pine woodlands	Common summer resident
Dendroica castanea	Bay-breasted Warbler	Deciduous woodlands	Uncommon spring & fall transient
Dendroica striata	Blackpoll Warbler	Coniferous & Deciduous woodlands	Common fall transient
Mniotilta varia	Black and White Warbler	Deciduous woodlands	Common summer resident
Setophaga ruticilla	American Redstart	Deciduous woodlands	Common summer resident
Seiurus aurocapilla	Ovenbird	Deciduous woodlands	Common summer resident
Piranga olivacea	Scarlet Tanager	Deciduous woodlands	Common summer resident
Pipilo erythrophthalmus	Eastern Towhee	Scrub, heavy undergrowth	Present all year
Melopiza melodia	Song Sparrow	Woodland edges, wet brushy fields, marsh	Common permanent resident
Zonotrichia albicollis	White-throated Sparrow	Thickets, woodland edges, roadsides	Common fall transient/winter resident
Junco hyemalis	Dark-eyed Junco	Woodland edges, brush	Common fall transient/winter resident
Cardinalis cardinalis	Northern Cardinal	Residential areas, woodland edges, thickets	Common permanent resident
Pheucticus ludovicianus	Rose-breasted Grosbeak	Deciduous woodlands	Common spring transient
Quiscalus quiscula	Common Grackle	Woodlands, residential areas	Present all year
Molothrus ater	Brow-headed Cowbird	Farms, fields, residential areas	Present all year
Icterus galbula	Baltimore Oriole	Deciduous woodlands	Common summer resident
Carduelis tristis	American Goldfinch	Woodland edges, fields, roadsides, feeders	Common summer resident

Mammals.

The mammal populations on Martha's Vineyard are perhaps the most manipulated, with the introduction of non-native species and the extermination and re-introduction of other species (Keith, 1969). Most of the island's terrestrial mammals are woodland dwellers and are familiar to local residents.

Acorns are abundant in these oak forests and provide an important food source for a variety of wildlife species including squirrels and small rodents, as well as birds including blue jays, chickadees, turkeys, grosbeaks, cardinals and woodpeckers. Acorns also account for up to 25% of the White-tailed deer's diet in the winter. MassWildlife estimates that there are 45 to 55 deer per square mile on Martha's Vineyard. Several mature deer were observed at the site. Other mammals present at the site are the white cottontail, the striped skunk, the grey squirrel and a variety of small rodents. Table 3 contains a list of Massachusetts mammal species known to occur on Martha's Vineyard (Cardoza, 2009).

Table 3 - Martha's Vineyard Mammal Species

Scientific Name	Common Name	Occurance
Sciurus carolinensis	Eastern Gray Squirrel	Direct on-site observation
Tamias striatus	Eastern Chipmunk	Likely occurring
Microtus pennsylvanicus	Meadow Vole	Direct regional observation
Peromyscus leucopus	White-footed Mouse	Likely occurring
Peromyscus maniculatus	Deer Mouse	Likely occurring
Rattus norvegicus	Brown (Norway) Rat	Likely occurring
Sylvilagus floridanus	Eastern Cottontail	Direct on-site observation
Blarina brevicauda	Northern Short-tailed Shrew	Likely occurring
Sorex cinereus	Cinereus Shrew	Likely occurring
Scalopus aquaticus	Eastern Mole	Direct regional observation
Myotis lucifugus	*Little Brown Myotis (bat)	Direct regional observation
Myotis septentrionalis	*Northern Myotis (bat)	Likely occurring
Lontra Canadensis	North American River Otter	Southern Lagoon Pond obs.
Mephitis mephitis	Striped Skunk	Indirectly observed
Procyon lotor	Racoon	Direct local observation
Odocoileus virginianus	White-tailed Deer	Direct on-site observation

*Bat populations across the northeast United States declined dramatically from 2006 to the present from white-nose syndrome (WNS) caused by a newly identified fungus.

Amphibians & Reptiles.

Amphibians (species of frogs and toads, salamanders and newts) require close proximity to a freshwater aquatic environment for breeding. This dry, forested site does not contain any obvious permanent or ephemeral freshwater bodies and the excessively drained soils would not pond water for long enough periods to provide shallow breeding pools. Therefore it is doubtful that any breeding amphibian populations would be found at the site. However, personal observations of Spotted Salamanders, Spring Peepers and Bullfrogs have been made more than .5 miles from any freshwater body in other locations on the island. So it is entirely possible to encounter an amphibian migrating through the site in search of freshwater.

Reptiles (species of turtles and snakes) are common on Martha's Vineyard. Unlike amphibians, they do not have an aquatic larval stage. With the exception of the Eastern Box Turtle, the remaining species of "pond turtles" live in and around marshes, swamps, bogs and freshwater and brackish water ponds. These turtles would not be present at the site. The Eastern Box Turtle is an entirely terrestrial species that occupies a variety of woodland habitats. It is listed as a "Species of Special Concern" and has not been directly observed in Oak Bluffs since 1988 (MassWildlife, 2011). Table 4 contains the amphibian and reptile species known to Martha's Vineyard.

Table 4 – Martha's Vineyard Amphibian and Reptile Species		
Scientific Name	**Common Name**	**Occurance**
Amphibians - Salamanders and Newts		
Ambystoma maculatum	Spotted Salamander	Unlikely/breeding habitat absent
Plethodon cinereus	Eastern Red-backed Salamander	Unlikely/breeding habitat absent
Hemidactylium scutatum	Four-toed Salamander	Unlikely/breeding habitat absent
Notophthalmum viridenscens	Eastern Newt	Unlikely/breeding habitat absent
Amphibians – Frogs and Toads		
Scaphiopus holbrookii	Eastern Spadefoot	Extirpated from much of MV
Anaxyrus americanus	American Toad	Unlikely/breeding habitat absent
Anaxyrus fowleri	Fowler's Toad	Unlikely/breeding habitat absent
Pseudacris crucifer	Spring Peeper	Unlikely/breeding habitat absent
Lithobates catesbeianus	American Bullfrog	Unlikely/breeding habitat absent
Lithobates clamitans	Green Frog	Unlikely/breeding habitat absent
Lithobates palustris	Pickerel Frog	Unlikely/breeding habitat absent
Reptiles – Turtles (Family Emydidea – Pond Turtles)		
Chelydra serpentine	Snapping Turtle	Unlikely/breeding habitat absent
Chrysemys picta	Painted Turtle	Unlikely/breeding habitat absent
Clemmys guttata	Spotted Turtle	Unlikely/breeding habitat absent
Terrapene Carolina	Eastern Box Turtle	Potentially/habitat present, but rare
Reptiles - Snakes		
Coluber constrictor	North American Racer (aka Black Snake)	Likely occurring
Diadophis punctatus	Ring-necked Snake	Likely occurring
Lampropeltis triangulum	Milksnake	Likely occurring
Ophedodrys vernalis	Smooth Greensnake	Likely occurring
Storeria occipitomaculata	Red-bellied Snake	Likely occurring
Thamnophis sauritus	Eastern Ribbonsnake	Likely occurring
Thamnophis sirtalis	Common Gartersnake	Likely occurring

Rare Moths

The NHESP database has identified four rare moth species in the vicinity of the subject property.

1. *Catocala herodias gerhardi* - Gerhard's Underwing Moth (Species of Special Concern)
2. *Zale lunifera (*sp. 1) - Pine Barrens Zale (Species of Special Concern)
3. *Stenoporpia polygrammaria* - Faded Gray Geometer (Threatened Species)
4. *Eacles imperialis* - Imperial Moth (Threatened Species)

The first two listed moths have a specific requirement of xeric scrub oak shrublands or barrens, with their larvae feeding predominantly on scrub oak. The subject site does not contain a barrens community. In fact, there are very few scrub oak individuals present. Therefore it is unlikely that *Catocala herodias gerhardi* and *Zale lunifera* would be breeding at this site.

The third moth species, *Stenoporpia polygrammaria*, was documented on Oak Bluffs in 2005 (MassWildlife, 2011). Black and white oaks are the larval host plants for this moth and are present at the site. However, Mello 2011 notes that *Stenoporpia polygrammaria* might only occasionally be found on the site, but in very low numbers presumably based upon other surveys across the island.

The pitch pine/oak forest community at the site may support breeding populations of the threatened Imperial Moth *(Eacles imperialis*) whose larvae feed predominantly on pitch pine and oak species and whose adults breed only on Martha's Vineyard at the northern end of their range (Mello, date unknown).

Summary

The 68± acre Danielson properties are presently under consideration for a subdivision of land for residential home construction. The site is bordered by low-density subdivisions to

the north, south and east and by Barnes Road to the west. The entirely forested community is estimated to be approximately 40-50 years in age. The land has been sculpted by glacial retreat forming a rolling terrain with erodible soils. Being situated in the Lagoon Pond watershed, careful planning, installation and maintenance of erosion and sediment control measures both before and during earth moving activities is critical in protecting Lagoon Pond and its aquatic resources from construction-related impacts.

Both fauna and flora species richness are directly related to the number and diversity of natural communities present in a region. The subject site contains a single community type with relatively low species diversity. The community exhibits several predominant flora species within each strata of the forest. Local wildlife populations, primarily small mammals and birds will use the site to some degree for travel, refuge, cover, and reproduction and, to a lesser degree, for feeding. The low numbers of fruiting trees and shrubs coupled with the absence of fresh water are limiting factors to the utilization of this site by large numbers of wildlife species. However, acorn eaters such as white-tailed deer, squirrels and some birds will find an adequate supply given the prevalence of white and black oaks.

The site does possess demonstrable breeding habitat for one species of rare moth, *Eacles imperialis.* This moth is present in Oak Bluffs, being most recently documented in 2006 (NHESP, 2009). Given the rarity of *Eacles imperialis* in New England, with its breeding populations limited to Martha's Vineyard, it is critical to preserve potential breeding sites. On Martha's Vineyard, NHESP has made it a priority to protect significant stands of pitch pine in an effort to accomplish this. The pitch pine groves at the site are concentrated, for the most part, along the periphery of the site, with several scattered clusters and

individuals located interior to the properties. Residential development at the site should strive to protect pitch pine groves in the following manner.

1. Creative cluster-design options could concentrate the building lots, allowing for the protection of uninterrupted open spaces containing the greatest density of pitch pines.

2. Building envelope selections that would preserve specimen pitch pines or pitch pine clusters on individual lots.

3. Conservation easements and/or restrictions to protect the open spaces from future impacts.

4. Selective thinning of competing species to encourage pitch pines to dominate in areas that are presently re-vegetating as a result of the caterpillar blight or other prior disturbances.

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